UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

August 12, 2002

MEMORANDUM TO: Janet R. Schlueter, Chief
High-Level Waste Branch
Division of Waste Management
Office of Nuclear Material Safety and Safeguards

FROM: Robert M. Latta, Sr. On-Site Licensing Representative
Repository Site Section
Division of Waste Management
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SUBJECT U.S. NUCLEAR REGULATORY COMMISSION ON-SITE LICENSING REPRESENTATIVES' REPORT ON YUCCA MOUNTAIN PROJECT FOR MAY 1, 2002, THROUGH JUNE 30, 2002

The purpose of this letter is to transmit the U.S. Nuclear Regulatory Commission (NRC) On-Site Representatives' (ORs') report for the period of May 1, 2002, through June 30, 2002.

This report highlights a number of Yucca Mountain Project activities of potential interest to NRC staff. The ORs' continue to respond to requests from NRC Headquarters staff to provide various documentation and feedback related to Key Technical Issues (KTIs) and their resolution. During this reporting period, the ORs' continued to observe activities associated with Yucca Mountain Site Characterization, KTIs, and audits. The ORs' also attended various meetings and accompanied NRC staff on visits to Yucca Mountain.

If you have any questions on this report or its enclosures, please call Robert Latta on (702) 794-5048; or Jack Parrott on (702) 794-5047.

Enclosure: U.S. Nuclear Regulatory Commission On-Site Licensing Representatives' Report, Number OR-02-03

Memorandum to Janet R. Schlueter, Chief dated August 12, 2002

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The purpose of this letter is to transmit the U.S. Nuclear Regulatory Commission (NRC) On-Site Representatives' (ORs') report for the period of May 1, 2002, through June 30, 2002.

This report highlights a number of Yucca Mountain Project activities of potential interest to NRC staff. The ORs' continue to respond to requests from NRC Headquarters staff to provide various documentation and feedback related to Key Technical Issues (KTIs) and their resolution. During this reporting period, the ORs' continued to observe activities associated with Yucca Mountain Site Characterization, KTIs, and audits. The ORs' also attended various meetings and accompanied NRC staff on visits to Yucca Mountain.

If you have any questions on this report or its enclosures, please call Robert Latta on (702) 794-5048; or Jack Parrott on (702) 794-5047.

Enclosure: U.S. Nuclear Regulatory Commission On-Site Licensing Representatives' Report, Number OR-02-03

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U.S. NUCLEAR REGULATORY COMMISSION

ON-SITE LICENSING REPRESENTATIVES' REPORT

NUMBER OR-02-03

FOR THE REPORTING PERIOD OF MAY 1, 2002 THROUGH JUNE 30, 2002

/s/

Robert M. Latta
Sr. On-Site Licensing Representative
High-Level Waste Branch
Division of Waste Management

/s/

Jack D. Parrott
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Reviewed and Approved By: /RA/, 08/12/02

Larry Campbell
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Enclosure

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1.0 EXECUTIVE SUMMARY

SOFTWARE MANAGEMENT AND DEVELOPMENT

Corrective Action Report (CAR), BSC-01-C-002, was initiated on June 12, 2001, to address deficiencies related to software controls and development. Specifically, this CAR identified areas of nonconformance concerning procedural compliance, lack of supplemental procedures, ineffective training, and software development deficiencies. In response to these adverse conditions, Bechtel SAIC Company, LLC (BSC) performed an extensive root cause analysis (completed August 8, 2001) to address the deficiencies documented in CAR BSC-01-C-002. Also, this cause analysis addressed model validation deficiencies documented in CAR BSC-01-C-001.

Several amended responses were submitted for CAR BSC-01-C-002, that resulted in open comments. Because of the protracted CAR response and comment resolution process, the final comments for CAR BSC-01-C-002 remained open for approximately one year. The extended period of time to resolve the final comments on CAR BSC-01-C-002, along with the project's inability to effectively address recurring deficiencies, related to software configuration management continues to be an area of concern.

FOLLOW-UP ON PRECLOSURE AGREEMENT PRE 6.01

During this reporting period the ORs' reviewed the ongoing issue resolution process for Preclosure Agreement PRE 6.01, concerning classification of structures, systems, and components (SSCs), and their risk-significance categorization. The purpose of agreement PRE 6.01 was to ensure that DOE's approach to the SSC classification and categorization process is based on acceptable technical criteria and that it is consistent with the requirements of 10 CFR Part 63. In response to this issue, DOE developed a new procedure AP-2.22Q, "Classification Criteria and Maintenance of the Monitored Geologic Repository Q-List."

Based on the staffs initial review of AP-2.22Q, several concerns were identified. These concerns included the staffs determination that the guidance provided in the procedure did not appear to contain sufficient detail for determining if an SSC is important to safety. Furthermore, the staff determined that the existing criteria in AP-2.22Q, were not adequate for establishing the quality assurance categorization of important to safety SSCs.

On May 23, 2002, the ORs' met with representatives from DOE and BSC to discuss the identified concerns and comments. In general, the DOE acknowledged the NRC concerns and agreed to revise procedure AP-2.22Q to address these issues.

OBSERVATION OF DOE's AUDIT OF BECHTEL SAIC COMPANY, LLC

During the week of May 6-10, 2002, staff from the Division of Waste Management (DWM) including the ORs', observed the DOEs Office of Quality Assurance audit of BSC. The scope of the audit was to evaluate BSC's implementation of the Office of Civilian Radioactive Waste Management (OCRWM) Quality Assurance Program. The audit team performed a limited

scope, compliance based audit of the implementation adequacy and effectiveness of the DOE quality assurance (QA) program and procedures in place for activities supporting the Yucca Mountain Site Characterization Project Office. As a result of the audit, 16 conditions adverse to quality were identified. These conditions included two Deficiency Identification Referrals (DIRs), concerning software management and training; six Deficiency Reports (DRs), relating to record packages and reviewer documentation, data submittal, scientific notebooks; and eight Quality Observations.

Although the individual significance of most of the 16 conditions adverse to quality is recognized as minor, the cumulative effects of these issues is of concern. Specifically, one of the deficiencies involved ineffective software management controls which has been the subject of extensive corrective actions including the current actions associated with CAR BSC-01-C-002, and four of the DRs and four of the Quality Observations involved the inadequate implementation of project controls for scientific investigations. Given that these conditions involve areas of recurring deficiencies for which previous corrective actions have been ineffective, the ORs' will continue to monitor DOEs progress related to developing and institutionalizing a program which fosters greater attention-to-detail and a more rigorous self-checking process.

GENERAL SITE ISSUES

A magnitude 4.4 earthquake occurred 20 kilometers (12.4 miles) from the Yucca Mountain site on June 14, 2002. DOE has not discovered any disturbance or damage to the Yucca Mountain Project's (Project) above or below-ground facilities.

A site work stand-down has been lifted to allow the continuation of all ongoing tests and the initiation of new test work at the site.

The site continues to operate without access to well water by relying on stored water for drinking and non-potable uses.

EXPLORATORY STUDIES FACILITY (ESF) TESTING

The drift scale thermal test continues its cool down phase. Transient liquid water has been detected in at least one borehole in the test area. DOE attributes the presence of this liquid water to condensation within the borehole from cooling of the rock.

ENHANCED CHARACTERIZATION OF THE REPOSITORY BLOCK (ECRB) TESTING

The bulkhead at one end of the sealed portion of the ECRB cross drift was opened to allow access for GEOTECHNICAL testing and sampling. The ORs' inspected this section of the ECRB after it was opened on June 24, 2002. Minor amounts of liquid water were present that appeared to be attributable to condensation. In spite of the June 14, 2002, earthquake, very little rock fall was observed on the plastic sheeting that had been placed on the floor of parts of the sealed ECRB to detect dripping water.

SURFACE BASED FIELD TESTING

The cross-hole tracer tests at the well 19 complex of the Nye County Early Warning Drilling Program have been put on hold indefinitely due to the State's nonrenewal of an expired permit waiver.

LABORATORY STUDIES

The breached drip shield test at the Atlas facility has been initiated. The natural convection test at the Atlas facility has been formally concluded.

UPCOMING NEW TESTS AND STUDIES

Upcoming new geotechnical sampling and tests are planned for a previously sealed portion of the ECRB cross drift, and at the Pena Blanca, Mexico site (natural analog program).

REPORT DETAILS

2.0 INTRODUCTION

The principal purpose of the OR report is to inform NRC staff, managers, and contractors of information on the DOE programs for site characterization, repository design, performance assessment, and environmental studies that may be of use in fulfilling NRC's role during pre-licensing consultation. The primary focus of this and future OR reports will be on DOE's programs for the Exploratory Studies Facility (ESF), surface-based testing, performance assessment, data management systems, and environmental studies. Relevant information includes new technical data, DOE's plans and schedules, and the status of activities to pursue site suitability. The ORs' also participate in activities associated with resolving NRC Key Technical Issues's (KTIs). This report covers the period of May 1, 2002, through June 30, 2002.

3.0 OBJECTIVES

The OR mission is to serve principally as a point of prompt informational exchange and to identify preliminary concerns about site investigations relating to potential licensing issues. The ORs' accomplish this function by gathering and evaluating information, communicating, identifying concerns, and raising more significant issues to managements attention. Communication is achieved by exchanging information on data, plans, schedules, documents, activities and pending actions, and resolution of issues. The ORs' interact with DOE scientists, engineers, and managers with input from NRC Headquarters management regarding NRC policy, programs, and regulations. The ORs' also focus on such issues as QA, design controls, data management systems, performance assessment, and KTIs resolution. A primary OR role is to identify areas in site characterization and related studies, activities, or procedures that may be of interest or concern to the NRC staff.

4.0 QUALITY ASSURANCE AND ENGINEERING

Software Management and Development

As previously documented in NRC OR Report 03-01, dated August 16, 2001, Corrective Action Report (CAR), BSC-01-C-002, was initiated on June 12, 2001, to address deficiencies related to software controls and development. Specifically, this CAR identified areas of nonconformance concerning procedural compliance, lack of supplemental procedures, ineffective training, and software development deficiencies. In response to these adverse conditions, Bechtel SAIC Company, LLC (BSC) performed an extensive root cause analysis (completed August 8, 2001) to address the deficiencies documented in CAR BSC-01-C-002 (Software). Also, this root cause analysis addressed model validation deficiencies documented in CAR BSC-01-C-001 Following the identification of software related deficiencies, several amended responses were submitted on CAR BSC-01-C-002, that resulted in open comments. As a result of the protracted CAR response and comment resolution process, the final comments for CAR BSC-01-C-002, remained open for approximately one year. The extended period of time to resolve the final comments on CAR BSC-01-C-002, along with the projects inability to effectively address recurring deficiencies concerning software configuration management, continues to be an area of concern.

Subsequent to the identification of software related deficiencies in CAR BSC-01-C-002 , BSC instituted actions to curtail software development supporting the potential license application by implementing a limited management stand-down on software development. This limited stand-down is still in effect. However, as noted during the September 6, 2001, NRC/DOE QA meeting, BSC established provisions for issuing exemptions from the stand-down, provided the software was developed under increased management oversight. To date, approximately 60 codes have received exemptions and have been developed. These codes are primarily used to support ongoing analytical models related to site characterization activities. Corrective actions initiated by BSC also included software training to specifically address the roles, responsibilities, authority, and accountability issues identified in the root cause evaluation for CAR BSC-01-C-002.

The ORs' reviewed the actions to prevent recurrence described in CAR BSC-01-C-002 and determined that BSC is currently preparing supplemental procedures and revising the governing software management procedure AP-SI.1Q. The purpose of these new procedures and the revision of procedure AP-SI.1Q will be to improve the independent review and validation process associated with software development and to provide additional administrative controls for software configuration management and version control. Procedure development has started and it is anticipated that this activity will be completed during the August/September 2002 time frame. Project personnel will be trained on these procedures prior to their implementation and a self-assessment will be performed to validate the effectiveness of the training. The ORs' also were informed that oversight activities are planned to evaluate the current baselined software and software developed under the provisions of the software stand-down. Specifically, BSC QA will perform a surveillance on the baselined software and a BSC self-assessment will be performed on software developed under the limited software stand-down.

As indicated by BSC Project Management, the software stand-down will be lifted after actions to prevent recurrence, identified in CAR BSC-01-C-002, have been completed. These actions include the successful completion of the: 1) proposed procedure changes, 2) personnel training on the new procedures, 3) surveillance on baselined codes by BSC QA, and 4) self-assessment of software developed under exemption to the software stand-down. Furthermore, following the recission of the software stand-down, BSC plans to perform self-assessments on a sample of the software developed under the new procedures to confirm the adequacy of the actions to preclude recurrence.

The deficiencies associated with model validation and software configuration management are of concern to the NRC because they are repetitive in nature and they are indicative of inadequate implementation of the quality assurance program necessary for the resolution of key technical issues and the associated sub-issues. In order to gain additional confidence in the effectiveness of the corrective and preventive actions associated with CAR BSC-01-C-001 and CAR BSC-01-C-002, the ORs' will continue to monitor the results of BSC's assessment activities related to lifting the limited management stand-down on software development. The results of this OR monitoring will be documented in a future report.

Follow-Up on Preclosure Agreement PRE 6.01

During this reporting period the ORs' reviewed the ongoing issue resolution process for Preclosure Agreement PRE 6.01, concerning SSC classification and risk-significant categorization. The purpose of agreement PRE 6.01 was to ensure that DOE's approach to the SSC classification and categorization process is based on acceptable technical criteria and that it is consistent with the requirements of 10 CFR Part 63. The agreement specified that DOE should revise their current Q-List procedure QAP-2-3, "Classification of Permanent Items," to reflect that items important to safety and their quality level categorization are consistent with the design and the preclosure safety analysis. In response to this issue, DOE developed a new procedure AP-2.22Q, "Classification Criteria and Maintenance of the Monitored Geologic Repository Q-List," Revision 0, ICN 0.

Based on the staffs initial review of AP-2.22Q, several concerns were identified. These concerns along with questions related to the adequacy of the guidelines provided in AP-2.22Q were discussed at the NRC/DOE Technical Exchange conducted on July 24-26, 2001. As indicated by the NRC staff during this Technical Exchange, the guidance provided in the procedure did not appear to contain sufficient detail for determining if a SSC is important to safety. Furthermore, the staff determined that the existing criteria in AP-2.22Q, were not adequate for establishing the risk-significance categorization of important to safety SSCs.

To facilitate the resolution of this issue, the ORs' participated in the development of the NRC's response letter for agreement item PRE 6.01. This activity resulted in the identification of the following comments and concerns: (1)Procedure AP–2.22Q does not adequately discuss how DOE plans to identify SSCs important to safety or waste isolation, or how DOE plans to categorize those SSCs; (2)The Preclosure Safety Analysis Guide, TDR–MGR–RL–000002, Rev 00, dated February 2002, identifies several deterministic "factors" for consideration when evaluating the risk significance of an event sequence and associated classification. However, procedure AP–2.22Q does not currently identify or explain how these or other deterministic "factors" are considered during the categorization of SSCs important to safety or waste

isolation; (3)The quality assurance requirements identified in 10 CFR 63.142 (Quality Assurance Criteria) cannot be graded for important to safety SSCs categorized as Quality Level–1; (4)Procedure AP–2.22Q does not currently require DOE to submit any quality assurance records as part of their classification process; (5)Procedure AP–2.22Q does not appropriately address how DOE plans to reassess the safety classification and risk significance of SSCs important to safety or waste isolation or the safety or risk (Quality Level) categorization of those SSCs in the event new information is obtained or design changes are made; and (6)Procedure AP–2.22Q does not clearly indicate how the independent verification of design outputs will be accomplished for the Q-List and the analyses used to categorize important to safety SSCs; as required by both 10 CFR 63.142(d)(i) and Section 3.2.4 of DOE/RW-0333P "Quality Assurance Requirements and Description."

On May 23, 2002, the ORs' met with representatives from DOE and BSC to discuss the identified concerns and comments. In general, the DOE acknowledged the staffs comments and concerns and agreed to revise procedure AP-2.22Q to address these issues. However, to assure the timely resolution of this issue the ORs' will continue to monitor the activities related to Preclosure Agreement PRE 6.01 and the proposed changes to procedure AP-2.22Q.

Observation of DOE's Audit of Bechtel SAIC Company, LLC

During the week of May 6-10, 2002, staff from the Division of Waste Management (DWM) including the ORs', observed the DOE's Office of Quality Assurance audit of BSC. The scope of the audit was to evaluate BSC's implementation of the Office of Civilian Radioactive Waste Management (OCRWM) Quality Assurance Program. The audit team performed a compliance based evaluation of the implementation and effectiveness of the quality assurance (QA) program and procedures in place for activities supporting the Yucca Mountain Site Characterization Project Office. In addition, a review of the status of past OCRWM deficiency documents identified during previous QA audits or surveillances of BSC were included in the scope of this audit to determine the effectiveness of completed corrective actions. As a result of the audit, 16 conditions adverse to quality were identified including; two Deficiency Identification Referrals (DIRs), concerning software management and training; six Deficiency Reports (DRs), related to record packages, reviewer documentation, data submittal, and scientific notebooks; and eight Quality Observations.

Although the individual significance of most of the 16 conditions adverse to quality is recognized as minor, the cumulative effects of these issues is of concern. Specifically, one of the deficiencies involved ineffective software management controls which has been the subject of extensive corrective actions including the current actions associated with CAR BSC-01-C-002, and four of the DRs and four of the Quality Observations involved the inadequate implementation of project controls for Supplement III, of the QARD (Scientific Investigations.) Given that these conditions involve areas of recurring deficiencies for which previous corrective actions have been ineffective, the ORs' will continue to monitor DOEs progress related to developing and institutionalizing a program which fosters greater attention-to-detail and a rigorous self-checking processes.

Quality Assurance Program Oversight

As a result of a recent contract modification expanding the QA work scope, BSC has instituted QA surveillance activities and is in the process of implementing an independent internal audit program. Additionally, DOE OQA has established a new document, referred to as a Quality Observation, to report minor conditions adverse to quality that were previously documented as DRs. As previously documented in the meeting summary for the December 5, 2001, Quarterly NRC/DOE QA meeting, it is expected that DOE will issue a revision to their QARD, in the near future, to reflect the organizational responsibilities and reporting relationships for the new oversight functions.

5.0 OUTREACH ACTIVITIES

Public Meetings on the NRC's Draft Yucca Mountain Review Plan

On May 21-23, 2002, staff from the DWM and the ORs' conducted public meetings in Pahrump and Las Vegas, Nevada. The purpose of these meetings was to seek comment on the NRC's draft Yucca Mountain Review Plan (YMRP). These meetings were supported by staff from the Center for Nuclear Waste Regulatory Analyses (CNWRA), the Office of the General Counsel (OGC), and the Spent Fuel Project Office (SFPO). Subsequent to a general overview and introduction of NRC's role and regulatory program for Yucca Mountain, DWM and Center staff made presentations on the major portions of the draft YMRP. Following the presentations, the audience was invited to ask questions and offer comments. During these interactions, the staff noted that verbal and written comments received during the public meetings would be given the same consideration as other comments received by the close of the comment period. NRC brochures and information sheets, along with copies of the draft Yucca Mountain Review Plan, were made available to attendees. Requests were received to extend the period for public comment on the draft plan, and many members of the public expressed their opposition to the Yucca Mountain project. Clark County Chairman Dario Herrera identified a number of concerns at both Las Vegas meetings, including his observation that DOE had failed to adequately address the County's comments on the Draft and Supplemental Environmental Impact Statements for Yucca Mountain. During these meetings, the staff affirmed that: the NRC's independence from DOE; that the NRC's primary mission is protection of public health and safety; and that the staff will reach conclusions about all technical and licensing issues that are justified by the evidence.

6.0 FIELD AND LABORATORY TESTING

GENERAL ISSUES

Seismic Event

A magnitude 4.4 earthquake occurred on June 14, 2002, at 5:40 am PDT, at a location approximately 20 kilometers (12.4 miles) southeast of the potential repository and at a depth of 12 kilometers (7.5 miles). In addition, many aftershocks from the magnitude 4.4 event were recorded. On the same day there was an aftershock of magnitude 3.5 one hour after the mainshock, a magnitude 2.2 aftershock two hours after the mainshock, and another 15 aftershocks of magnitude 2.0 or less. This number and magnitude of aftershocks are normal.

Shortly after the event, DOE implemented inspections but did not uncovered evidence of disturbance or damage to the surface facilities, north and south portals, north ramp, main drift, cross drift, Yucca crest, and the sample management facility that is 16 kilometers (10 miles) east-southeast from the north portal. The million gallon tank, fire water tank, and potable water tank were also examined and no leaks were observed.

In response to the event, DOE implemented their "Management Plan to Verify Ground Support in Underground YMP Facilities Following a Seismic Event." As part of this plan, convergence pin monitoring in the ESF and ECRB were conducted and documented. Also being conducted as part of this plan is a measurement of water levels in selected boreholes, and a review of data from strong motion instrumentation. DOE's management plan procedures will be updated based on lessons learned from the event.

Site Work Stand-Down

A site work stand-down, as a result of a near-miss accident that occurred on March 26, 2002, and as described in the last OR report, has been gradually lifted (through the use of compensatory measures) to allow the continuation of ongoing tests and the initiation of new test work at the site. However, not all work restrictions will be lifted until all corrective actions (see below) have been completed.

BSC completed a Root Cause Incident Investigation Team Report on the near-miss accident and transmitted the findings to DOE on May 9, 2002. The report also contains a review of six previous related events. Based on these reviews, four significant findings were made. These four findings are: 1) on-site management systems need improvement; 2) work procedures are inadequate and as a result, are not used or followed; 3) there are communication problems concerning site work; and, 4) the on-site organization was dysfunctional in a number of work areas. The ORs' visited the site on June 20, 2002, and in response to these findings, observed changes in on-site management, on-site management systems, organization, and communication.

The report identified 74 suggested corrective actions that should be taken in response to the events reviewed in the report. In addition to addressing the corrective actions identified, the report recommends that the site culture and operating practices be transformed from that of a temporary site focused on construction to that of a permanent site focused on operations. The response to the suggested corrective actions and recommendation of the transition of site culture and operating practices will be addressed in a site operations plan to be delivered to DOE in August 2002.

Site Access to Water Supply

In early April 2002, the State of Nevada terminated DOE's permits to access to Nevada Test Site (NTS) water wells for water supply to the project. Prior to this, DOE installed a one-million gallon water reservoir in NTS Area 25, just east of Fortymile Wash along the road to Yucca Mountain. Access to certain surface areas at the project has been restricted to reduce the need to spray water for dust suppression.

During this reporting period, DOE supplemented its water available for dust control with water stored at the alluvial tracer complex (ATC) that was to be used for tracer tests. Since these tests have been suspended due to loss of State permitting for injecting tracers, the water stored at the ATC was no longer needed and is being used for dust control at the project. The water in

the million gallon reservoir has tested positive for coliform bacteria. Therefore its suitability for use in underground tests is questionable at this time.

EXPLORATORY STUDIES FACILITY (ESF) TESTING

The excavation of the ESF main drift, completed in 1997, allows the collection of scientific and engineering data at Yucca Mountain. DOE continues testing in the ESF main drift to supply data to support DOE's Total System Performance Assessment. Figure 1 shows the ESF test locations. Ongoing ESF testing activities are summarized below.

Alcove 5 (Drift Scale Test)

In accordance with the established DOE test plan, power to the heated drift was turned off in mid-January 2002, and the 4-year cool-down of the facility is being monitored. DOE is performing periodic visual and video inspection, water sampling, gas sampling, neutron logging, and electrical resistance tomography. The data being collected is primarily being used as input to the Thermal Testing AMR.

On June 4, 2002, it was reported to the ORs' that borehole 75 in the drift scale heater test has produced water from 5 of the last 6 samplings. DOE characterized the water as discolored (yellow), high in metals, chloride (but not fluoride), and sulfur. This is reportedly the first time water has been present in this borehole. DOE's explanation at this time is that the water is due to condensation of vapor from the still hot part of the borehole in the now cool part of the borehole, and that the metals and ions are from the packers and other in-hole materials. They are also testing for total organic carbon and titanium. Results from these tests were not available during this reporting period. More recent sampling attempts have yielded little water from borehole 75 and it appears to be drying out. DOE is trying to model this effect for the other boreholes as the heated drift cools down.

ENHANCED CHARACTERIZATION OF THE REPOSITORY BLOCK (ECRB) TESTING

The excavation of the ECRB cross drift, completed in October 1998, allows the collection of scientific and engineering data in stratigraphic units that constitute the bulk of the potential repository horizon. DOE continues ECRB testing to supply data to support the DOE Total System Performance Assessment. Figure 1 describes the ECRB test locations (see page 16 of this report). ECRB testing activities are summarized below.

Sealed Portion of the ECRB Cross-drift

In an on going effort to monitor moisture conditions in the sealed portions of the ERCB, the ECRB bulkheads from Station 22+01 and beyond were closed on November 14, 2001. The bulkhead at Station 17+63 was closed on December 20, 2001. Prior to the closure of those bulkheads, project personnel installed enhanced monitoring and collection equipment, including remote cameras and moisture collection devices, in accordance with the revised test plan. Plastic sheets and drip cloths infused with a pH sensitive chemical were installed near the crown of the tunnel, and numerous sample bottles were placed to collect possible drips from rock bolts.

DOE re-opened the bulkhead at Station 17+63, on June 24, 2002. The main purpose for this entry, which will last about 4 months, is to collect geotechnical samples and data between Station 17+63 and 22+01. The bulkhead at 17+63 will be re-sealed after that time. On the first day of the entry, several Principal Investigators entered for an initial inspection of moisture conditions under unventilated conditions. They took photographs and made observations of moisture conditions in the tunnel as far as the bulkhead at Station 22+01.

On following day, June 25, 2002, the NRC OR entered to examine the cross-drift test. Virtually no moisture was seen anywhere in the cross drift up to Station 22+01. Overall, the ORs' observed much less evidence of moisture than had been seen during a similar entry in early October 2001. However, small amounts of liquid water were seen on the plastic sheets in two areas. One of these areas had been photographed by the Principal Investigators during the unventilated entry the previous day, and from the ORs' observations, little change had occurred to this area since the time of the unventilated entry. No water droplets or pools were seen on the conveyor belts, and no moisture had collected on signs or cables.

The drip cloths appeared wet and were almost uniformly covered by colonies of mold. The mold was causing the drip cloths to badly deteriorate, and the ORs' were informed that most of the drip cloths had fallen in the tunnel sections beyond Station 22+01. One drip cloth that the ORs' observed contained almost no mold. It was located near a transformer at Station 21+00. The small amount of heat being given off by this transformer apparently kept the drip cloth from saturating with moisture. The drip cloth retained its original orange color near the transformer, but a few meters away from it had turned bluish-green in the presence of moisture. Apart from this drip cloth, which illustrated the thermal gradient near a transformer, it does not appear that the drip cloths are providing useful data any longer. In fact, by supporting colonies of molds that release mold spores, these drip cloths may actually be introducing a bio-hazard to the tunnel environment. We advised DOE that plastic sheets and other collectors made of inert materials should be preferable for future tests.

The sample bottles mounted below rock bolts were out of our reach in the upper part of the tunnel wall, but none appeared to contain water. The ORs' observed dust or rust particles in some of the bottles, probably due to abrasion of wall rock and rusty steel reinforcement members during placement of the bottles.

Also, while in the tunnel, the ORs' observed that the bulkhead at Station 22+01 was not properly sealed. The rubberized tape had come loose along the right margin of the large access door. The loose tape made it possible to look through the gap between the bulkhead door and the wall rock into the chamber beyond. The ORs' brought this situation to DOE's attention and advised that a proper seal be restored as soon as possible to minimize any drying effects for the tunnel segments beyond Station 22+01. Currently the air intake for open tunnel ventilation was located less than 2 meters (6.5 feet) from the bulkhead at 22+01 and could readily draw air and moisture from beyond a compromised bulkhead at 22+01. DOE informed the ORs' that the incomplete seal would be repaired and that they had already planned to move the air intake away from the bulkhead.

The ORs' will monitor the geotechnical work to be performed in this section of the ECRB cross-drift over the next 4 months, and the repairs to the bulkhead at 22+01.

SURFACE BASED FIELD TESTING

Alluvial Tracer Complex (ATC) and Saturated Zone Testing

The ATC is a joint Nye County and DOE Cooperative Program to investigate flow and transport properties of the saturated alluvium. Single-well ATC hydrologic and tracer testing at well NC-EWDP-19D/D1 have been completed.

Part of the testing program was to include cross-hole tracer tests at well NC-EWDP-19D/D1, in which tracers would have been introduced via observation wells. Well 19D1, which is located in the deepest zone in the saturated alluvium, was scheduled to be pumped during those tests to recover the tracers through lateral flow from the observation wells. However, these tracer tests are currently on hold as the State Engineer has not renewed permit waivers for the cross-hole test tracers. Because non-renewal of these permits will impact efforts to validate the saturated zone flow and transport models, other alternatives to this testing are being investigated.

LABORATORY STUDIES

Busted Butte Unsaturated Zone Transport Test

Atomic Energy of Canada, LTD. (AECL) is performing radionuclide transport tests on 1 cubic meter blocks of rock extracted from the Busted Butte Test Facility. The OR office has received the AECL March-April 2002 status report on radionuclide migration experiments. These laboratory tests involve injection of fluorescein dye and radioactive tracers into the blocks of tuff collected from the Calico hills unit at Busted Butte. One block is used to represent unstaturated zone (UZ) experiments and the other for saturated tests. The radioisotope inventory in the US tuff block has now reached 6.2 E7 Bq, or 1.7 mCi.

The radioisotope inventory in the tuff block representing the saturated zone (SZ) is about half that in the UZ block. Results continue to show strongly reducing chemical conditions in the SZ block. Most of the injected ^{99}Tc is being retained within the block. This status report describes a set of experiments to determine if the fluorescein dye was causing the chemically reducing conditions. Indications from these experiments are that the fluorescein dye is causing the chemically reducing conditions. What is not known is if the fluorescein dye caused the reducing conditions directly or if the fluorescein dye is acting as a nutrient for chemically reducing microbes. Additional experiments are planned to answer this question.

Engineered Barrier System (EBS) Testing (Atlas Facility)

The EBS Operations Office of the Yucca Mountain Project continues to perform EBS testing. These tests are performed in a Test Facility located in North Las Vegas known as the Atlas facility. Test results are used to support the EBS degradation and transport process model report.

A. Atlas Natural Convection Test

This test was performed to study the natural convection and moisture condensation in the post-closure time period. This test was conducted to support elements of KTI Thermal Effects on Flow Agreements 2.4, 2.5, and 2.10, and was formally concluded on May 22, 2002.

On May 15, 2002, the OR and a member of the CNWRA Staff visited the ATLAS Test Facility to observe some of the results of the Natural Convection Tests. The test was designed to evaluate the three dimensional effects of a distributed heat load in a scaled drift environment, under post-closure (non-ventilated) conditions, and was designed to develop, acquire, and obtain data to support model validation for the EBS. The data obtained from this test will be used for the validation of the natural convection model implemented with the FLUENT computational fluid dynamic code (Version 5.5).

Some of the key design features of the test are summarized in the following discussion. The test was performed on two geometric scales (25 and 44 percent). The drift was simulated using insulation wrapped concrete pipe, steel waste packages and supports, and a crushed tuff invert. The test matrix included configurations with and without drip shields. The test simulated six of the nine waste package designs and was scaled for both size and spacing.

At the time of this visit, the testing had been completed and the data was being evaluated. The preliminary findings indicated that there was not a significant difference between the test data and the results of the FLUENT code for similar conditions. The results will be formalized in a report.

B. Atlas Breached Drip Shield Study

On May 8, 2002, an OR visited the Atlas test facility to observe the initiation of the study of the seepage flux through the drip shield in the post-closure time period. This test is being conducted to support resolution on Total System Performance Assessment and Integration KTI, Agreement 3.16. The first part of this test is on a full scale mock up of a drip shield with a smooth surface. Later this summer, the test will be done on a mock up of a drip shield with a rough surface to simulate the presence of corrosion products or dust. The entire study is scheduled to be completed by the end of July with a written report by the end of September, 2002.

UPCOMING NEW TESTS AND STUDIES

ECRB Cross Drift Geotechnical Rock Properties Studies

As of June 24, 2002, DOE has gained access to the portion of the ECRB cross drift between the bulkheads at Stations 17+63 and 22+01 to take geotechnical rock property samples and to do a slot test in the lower lithophysal zone. This work will occur over the next 4 months.

Pena Blanca (Natural Analog Program)

As of the end of June, the drill rig was still at the U.S./Mexico border awaiting clearance to cross into Mexico.

Inyo County Well Drilling

By the end of September 2002, Inyo County, California, plans to begin drilling 5 deep monitoring wells in the county as part of their Yucca Mountain oversight program. The county's rationale for drilling these new wells is: 1) to evaluate regional groundwater flow through the southern Funeral Mountains; 2) to establish structural controls on flow-paths and discharge areas; and 3) to evaluate potential zones of mixing between the deep regional groundwater and the local shallow groundwater systems to the northeast. The county is currently establishing the location of the new wells.

7.0 GENERAL ACTIVITIES

a. Meetings

NRC Staff Meet with DOE on the Draft Yucca Mountain Review Plan, Revision 2

On June 4, 2002, staff from the Division of Waste Management, including the ORs', met with representatives from DOE to conduct a technical exchange on the draft Yucca Mountain Review Plan, Revision 2, in Las Vegas, Nevada. The staff held the meeting with DOE to clarify the purpose and content of the draft review plan. The technical exchange was the fourth meeting on the review plan during the public comment period, which now ends August 12, 2002. The staff discussed four main topics. First, it addressed the risk-informed, performance-based framework of the draft review plan. Second, it addressed the risk-informed, performance-based format and content with a potential license application. Third, it described possible differentiation of requirements for different licensing stages. Finally, the staff discussed matters related to the consistent use of terminology in the draft review plan. At the conclusion of the technical exchange, DOE identified their plans to provide written comments on the draft review plan to the NRC.

Igneous Activity Consequences Peer Review Kickoff Meeting

On May 21-22, 2002, the ORs' along with technical staff from the NRC and CNWRA attended the DOE sponsored Igneous Activity Consequences Peer Review kickoff meeting. General topics addressed during this kickoff meeting included: Overview of Igneous Consequences Peer Review Process; Modeling Igneous Disruption in Yucca Mountain Total System Performance Assessment; Probability of Occurrence; Overview of Previous PVHA and Applications of Results; Overview of YMR Volcanology; and NRC Persepctive on Magma Repository Interaction.

The DOE requested that BSC conduct a Peer Review of the Yucca Mountain Project's approach to analysis of igneous consequences in order to evaluate the current technical basis used to analyze the consequences of igneous events that have the potential to impact the repository. Additionally, the Peer Review is to assess the analysis and modeling program and recommend any new tasks that would significantly strengthen the program. As stated during the meeting, the Peer Review will be conducted in accordance with DOE Administrative procedure AP-2.12Q, "Peer Review." The six panel members include: Dr. R. Budnitz (Chair), Dr. E.M. Detourney, Dr. L. Mastin, Dr. A. Pearson, Dr. A. Rubin, and Dr. F. Sepra.

The Peer Review Panel anticipates issuing an interim report to DOE/BSC in August 2002, and

the final report to DOE/BSC is expected to be issued in January 2003.

NRC/DOE Technical Exchange on Electronic Submissions

On June 25-26, 2002, members of the NRC, including the ORs' held a technical exchange with DOE concerning the electronic submission of documents associated with a potential license application and associated proceedings for a Yucca Mountain high-level waste repository. Topics discussed during the meeting included both technical issues and provided presentations on the HLW architecture, Electronic Information Exchange process, Electronic Hearing Docket for a potential HLW proceeding, electronic courtroom, technical issues associated with a potential license application submission and other large documents, status of placing the NRC HLW documentary collection on the Licensing Support Network (LSN), and the status of LSN test server. DOE, and its contractor BSC, provided a presentation on the status of its effort for placing documentary material on the LSN. Additionally, representatives from the University of Nevada and Las Vegas Information Science Research Institute presented the results of recent studies of documentary retrievability for information purposes. Representatives from the NRC's Office of Nuclear Material Safety and Safeguards, Office of the Chief Information Officer, Office of the Secretary, Atomic Safety Licensing Board Panel, and Office of the General Counsel also participated in this meeting. Future meetings between the NRC, DOE, and other potential parties concerning electronic submissions are anticipated.

a. Site Visits

On May 2, 2002, the ORs' visited the Yucca Mountain site for required training on unescorted access to the underground areas. This included training on how to access the "refuge chambers" in the ECRB cross drift. DOE has recognized that both ECRB Alcove 8 and the sealed cross drift can provide safe havens to workers in the event of fires or cave-ins that would prevent evacuation of the tunnel. If needed, workers can enter these areas and seal off the entries until safe conditions are restored or rescuers arrive. They also received respirators and associated fit tests to allow access to underground areas where respiratory protection is required.

On May 8, 2002, an OR visited the Atlas facility to observe the initiation of the seepage flux test.

On May 9, 2002, an OR visited the site to complete General Underground Training allowing unescorted access to the underground facilities.

On June 20, 2002, the ORs' visited the site to receive special respirator fit tests to allow access to the unsealed portion of the ECRB behind the bulkhead at Station 17+63. This area had a potentially high mold spore count thus requiring the use of full face masks.

Also during the June 20, 2002, site visit, the ORs' attended the Site Operations/DOE weekly meeting and the daily Site Operations Plan of the Day meeting. Both meetings were a discussion of site status, ongoing work status, and upcoming work. The ORs' also meet with the new Site Operations Manager and other site management personnel and discussed the changes made or being made to site operations management as a result of the lessons learned from the near miss incident described in the last OR report.

After the ECRB entry on June 25, 2002, described in Section 6, the ORs' visited the Sample Management Facility (SMF) to observe general procedures in preparing and storing the drill cutting samples being collected under Nye County's Early Warning Drilling Program. Samples from well Nye-23P were laid out for examination and logging by project personnel. A

preliminary log is prepared that is sent in as a record and later a more detailed geologic log is prepared by U.S. Geological Survey staff for stratigraphic interpretation.

On June 27, 2002, the OR accompanied staff from the DWM and the Chief Information Officer's Office on a site tour of the Yucca Mountain facility. The purpose of this tour was to obtain an overview of the Yucca Mountain site, underground facilities, and DOE's site characterization activities.

There were no outstanding issues raised as a result of these visits.

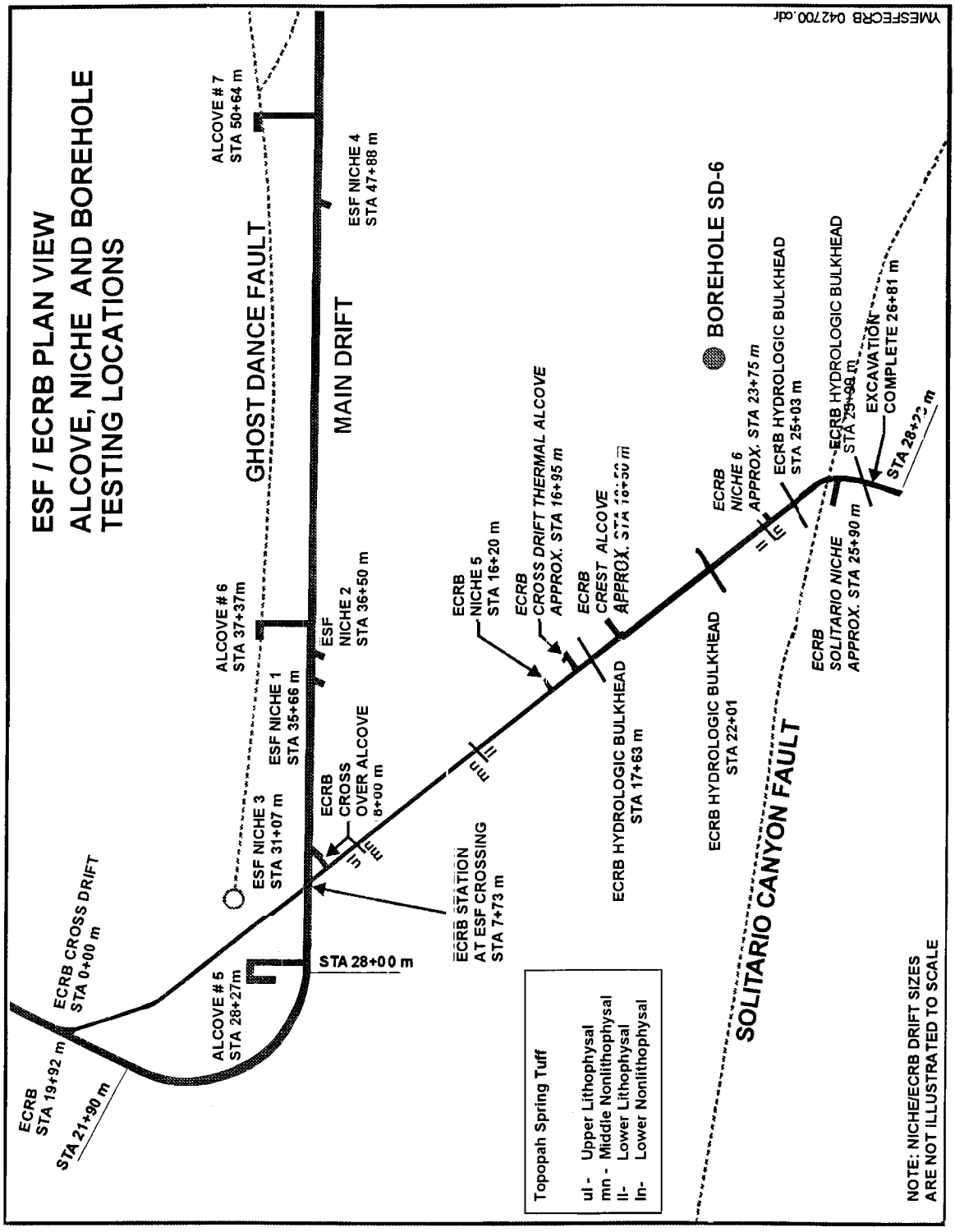
ESF / ECRB PLAN VIEW
ALCOVE, NICHE AND BOREHOLE
TESTING LOCATIONS
MESFECRB 042700.dgn
GHOST DANCE FAULT
MAIN DRIFT
SOLITARIO CANYON FAULT
BOREHOLE SD-6
ECRB CROSS DRIFT STA 0+00 m
ECRB STA 19+92 m
STA 21+90 m
ALCOVE # 5 STA 28+27m
ALCOVE # 6 STA 37+37m
ALCOVE # 7 STA 50+64 m
ESF NICHE 3 STA 31+07 m
ESF NICHE 1 STA 35+66 m
ESF NICHE 2 STA 36+50 m
ESF NICHE 4 STA 47+88 m
ECRB CROSS OVER ALCOVE STA 8+00 m
STA 28+00 m
ECRB STATION AT ESF CROSSING STA 7+73 m
ECRB NICHE 5 STA 16+20 m
ECRB CROSS DRIFT THERMAL ALCOVE APPROX. STA 16+95 m
ECRB CREST ALCOVE APPROX. STA 16+50 m
ECRB HYDROLOGIC BULKHEAD STA 17+63 m
ECRB HYDROLOGIC BULKHEAD STA 22+01
ECRB NICHE 6 APPROX. STA 23+75 m
ECRB HYDROLOGIC BULKHEAD STA 25+03 m
ECRB SOLITARIO NICHE APPROX. STA 25+90 m
ECRB HYDROLOGIC BULKHEAD STA 25+99 m
EXCAVATION COMPLETE 26+81 m
STA 28+22 m
Topopah Spring Tuff
ul - Upper Lithophysal
mn - Middle Nonlithophysal
ll- Lower Lithophysal
ln- Lower Nonlithophysal
NOTE: NICHE/ECRB DRIFT SIZES
ARE NOT ILLUSTRATED TO SCALE

Figure 1